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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/735,985	12/13/2000	Tihiro Ohkawa	11157.8	5701

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Neil K. Nydegger, Esq.
NYDEGGER & ASSOCIATES
348 Olive Street
San Diego, CA 92103

EXAMINER

MUTSCHLER, BRIAN L

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 10/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/735,985

Applicant(s)

OHKAWA, TIHIRO

Examiner

Brian L. Mutschler

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 19 is/are rejected.
- 7) ☒ Claim(s) 17 and 18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claims 13 and 15 are objected to because of the following informalities:
 - a. In claim 13 at line 7, please change the word "and" following "communication" to --with--.
 - b. In claim 15 at line 5, please insert --solution-- after "electrolyte".
 - c. In claim 15 at line 6, please insert --solution-- after "electrolyte".Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claims 2, 3 and 8-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation "means for selectively polarizing said ferroelectric member to charge the electrolyte solution" in lines 1-3. This limitation is indefinite because the electrolyte cannot be charged; an electrolyte already contains both positively and negatively charged particles. It appears that the ferroelectric member is the feature that is charged by the polarizing means. The same applies to dependent claim 3.

Claim 8 recites the limitation "a first electrode" in line 4. This limitation is indefinite because it implies the presence of similar electrodes, such as a second electrode. It is suggested that the phrase be changed to --a polarizing electrode--, as the electrode is referred to in the disclosure (see first full paragraph on page 12). The same applies to dependent claims 9-11.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4, 6, 7 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Batha et al. (U.S. Pat. No. 3,930,982).

Regarding claim 1, Batha et al. disclose an electrophoretic/electroosmotic device comprising a conduit having polarized ferroelectric member **21** positioned for interaction with the solution (fig. 1; col. 3, lines 42-68). The device further comprises a means for selectively establishing a potential difference across the conduit (fig. 1).

Regarding claim 2, the device comprises a plurality of electrodes **22** and **23** to selectively polarize the ferroelectric member **21** (fig. 1; col. 4, lines 41-60).

Regarding claim 4, the device has an electrode **22** positioned between a first end of the conduit and a portion of the conduit and a second electrode **23** positioned at least in part between second end and the portion of the conduit (fig. 1). The power source **26**

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establishes a potential difference between the electrodes via the ferroelectric member **21** (figs. 1 and 6).

Regarding claim 6, the ferroelectric member **21** can be made from materials including barium titanate, barium niobate and strontium niobate (col. 4, lines 1-6).

Regarding claim 7, the device comprises a means for establishing an alternating current that would be capable of de-polarizing the ferroelectric material (fig. 1).

Since Batha et al. teach all of the structural limitations recited in the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-14, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/22427, herein referred to as WO '427, in view of Batha et al. (U.S. Pat. No. 3,930,982).

Regarding claim 1, WO '427 discloses a device having a polarizable (conductor) member **6** positioned along a conduit for interaction with a liquid containing positively and negatively charged particles (figs. 1, 2A and 2B). The device also has a voltage means for applying a voltage difference over the longitudinal direction of the conduit (fig. 1; page 2, line 27 to page 3, line 14).

Regarding claim 2, the device further comprises a second voltage means that selectively polarizes the conductor member **6** to create a voltage difference between the conductor member **6** and the liquid (page 2, line 27 to page 3, line 14).

Regarding claim 3, the polarizing voltage means can be either a direct current or can be alternated and adjusted (page 8, line 31 to page 12, line 21).

Regarding claim 4, the device comprises a first electrode **4** positioned between a first end and a portion of the conduit and a second electrode **5** positioned between a second end and the portion of the conduit (fig. 1); the positions of the electrodes within the conduits are shown in Figures 3 and 4. The voltage between electrodes **4** and **5** is set at a voltage of V_1 (page 8, lines 10-30).

Regarding claim 5, the potential is set to a single voltage, V_1 , which would require a DC current source (page 8, lines 10-30).

Regarding claim 7, the device comprises means for alternating and adjusting the electric field (page 6, lines 21-32).

Regarding claim 8, the device in WO '427 comprises a polarizing electrode that polarizes conducting member **6**, a polarizing voltage source to polarize the member, a first driving electrode **4**, a second driving electrode **5**, and a second voltage source to create an potential difference between the driving electrodes (fig. 1; page 2, line 27 to page 3, line 14). In addition, both voltage means can generate an alternating electric field (page 6, lines 21-32).

Regarding claim 9, WO '427 teaches the separation of the conductive elements from the solution by a thin insulating material (page 10, lines 6-20).

Regarding claims 10 and 11, the first and second alternating voltage sources are “substantially synchronous” (page 6, lines 21-32).

Regarding claim 12, WO '427 teaches a system comprising a conduit formed with a lumen and having a first end and a second end, a polarizable conductor member **17** disposed along the conduit for interaction with a liquid, means for polarizing the conductor member **17**, and means for establishing a potential difference across the portion of the conduit to apply a force on the solution (fig. 3; page 10, line 21 to page 11, line 9).

Regarding claim 13, the system comprises a second conduit with a lumen and two ends, wherein one end is connected to an end of the first conduit at a junction (fig. 3; page 10, line 21 to page 11, line 9). The second conduit also has a conductor member **18** disposed along the second conduit (fig. 3). A controller **40** provides means for polarizing the second conductor member **18** (fig. 3). The device also comprises means **20** and **21** to apply a potential difference to apply a force on the solution in the lumen of the second conduit (fig. 3).

Regarding claim 14, the device further comprises a third conduit with a lumen in fluid communication with the junction (fig. 3).

Regarding claim 16, WO '427 discloses a method for manipulating a solution containing ions of opposing polarities. The method provides a polarizable member and placing the member in contact with the solution (fig. 1; page 2, line 27 to page 3, line 14). A first electric field is used to polarize the conductor member to draw one charged species to the surface of the conductor member, and a second electric field is used to

create a force on the second charged species and create a flow in the direction of the second electric field (figs. 2A and 2B; page 8, line 31 to page 9, line 23).

Regarding claim 19, the electric fields may vary with time and have substantially the same angular frequency (page 6, lines 21-32).

The device and method of WO '427 differs from the instant invention because WO '427 does not disclose the use of a ferroelectric material as the conductor member, as recited in claims 1, 12 and 16. Additionally, WO '427 does not disclose the use of a metal titanate, a metal tantalate, a metal niobate or a metal tungstate, as recited in claim 6. The conductor member of WO '427 merely requires a material capable of being polarized.

Batha et al. disclose an electrophoretic/electroosmotic apparatus using polarizable ferroelectric materials, the polarizability of which can "be reversed or reoriented by application of a suitably directed electric field" (col. 3, lines 42-53).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the conductor member of WO '427 to use a ferroelectric material as taught by Batha et al. because Batha et al. teaches that ferroelectric materials are polarizable and the polarization can be reversed or reoriented by suitable electric fields, thus meeting the criteria set forth by WO '427.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/22427 in view of Batha et al. (U.S. Pat. No. 3,930,982), as applied above to claims 1-14, 16 and 19, and further in view of Herrick et al. (U.S. Pat. No. 5,282,942).

WO '427 and Batha et al. describe a device and method having the limitations recited in claims 1-14, 16 and 19 of the instant invention, as explained above in section 7. WO '427 does not show the source of the solution.

The device described by WO '427 and Batha et al. differs from the instant invention because they do not disclose the use of reservoirs attached to the first and second conduits, as recited in claim 15.

Herrick et al. disclose an electrophoretic/electroosmotic device having a conductive element disposed along the conduit and means for providing a force along the conduit (fig. 1). The conduit has reservoirs connected to the end to provide a source and collection container for the conduit (fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device of WO '427 and Batha et al. to use reservoirs as taught by Herrick et al. because reservoirs provide a source and outlet for the solution passing through the conduit.

Allowable Subject Matter

9. Claims 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 17 and 18 are distinguished over the prior art of record because they provide a use for ferroelectric materials in electroosmotic devices neither taught nor suggested by the prior art of record. While Batha et al. suggest the use of ferroelectric

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materials as conductive members to drive the movement of a solution, the ferroelectric member is not polarized by an electric field that is subsequently removed before establishing a second electric field to drive the solution, as recited in claim 17. Batha et al. do not teach the method of claim 18 where an alternating electric field of decreasing amplitude is used to de-polarize the ferroelectric member to stop the flow of the solution. Batha et al. does not teach the de-polarization of the ferroelectric member. The method of claims 17 and 18 provides steps to control the electroosmotic flow in a conduit that takes advantage of the properties of ferroelectric materials.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references teach the use of a conductive member disposed along a conduit to control the electroosmotic flow by affecting the surface charge in the conduit.

U.S. Pat. No. 4,908,112 Pace

U.S. Pat. No. 5,092,972 Ghowsi

U.S. Pat. No. 5,151,164 Blanchard et al.

U.S. Pat. No. 5,240,585 Young et al.

U.S. Pat. No. 5,262,031 Lux et al.

U.S. Pat. No. 5,320,730 Ewing et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703)

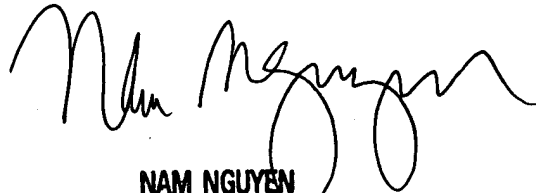
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305-0180. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

blm
October 7, 2003



NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700